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Three new records of brown parmelioid lichens from the Tibetan Plateau

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Abstract—Three brown parmelioid lichens from the Tibetan Plateau are recorded as new to China: *Melanelixia albertana*, *M. subaurifera* and *Melanohalea gomukhensis*.

Keywords —Asia, Yunnan, Sichuan, lichenized fungi, taxonomy

Introduction

Both *Melanelixia* species and *Melanohalea* species have been placed in the genus *Melanelia* Essl. in its original sense. Based on molecular, chemical, and morphological data, Blanco et al. (2004) segregated *Melanelixia* and *Melanohalea* from *Melanelia*. *Melanelixia* is characterized by often lacking pseudocyphellae and by containing lecanoric acid as the primary medullary constituent (Blanco et al. 2004, Esslinger 1977). *Melanohalea* is morphologically characterized by an upper surface usually with pseudocyphellae, by a non-pored epicortex, and by a medulla containing depsidones or lacking secondary compounds (Blanco et al. 2004, Esslinger 1977).

Worldwide, *Melanohalea* includes twenty known species (Zhao et al. 2009) and *Melanelixia* nine species (Wang et al. 2008). In China, seven *Melanelixia* species (*M. fuliginosa*, *M. glabra*, *M. glabroides*, *M. huei*, *M. subargentifera*, *M. subvillosella*, *M. villosella*; Wang et al. 2009) and nine *Melanohalea* species (*M. exasperata*, *M. exasperatula*, *M. elegantula*, *M. lobulata*, *M. olivacea*, *M. olivaceoides*, *M. poeltii*, *M. subelegantula*, *M. septentrionalis;* Wang et al. 2009, Zhao et al. 2009) have been recorded.

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During our study on the lichen flora of the Tibetan Plateau, *Melanelixia albertana*, *M. subaurifera,* and *Melanohalea gomukhensis* were found in China for the first time. This means that all known species of *Melanelixia* have now been recorded in China.

Materials and methods

The specimens studied were collected from the Tibetan Plateau, China, and are preserved in SDNU (Lichen Section of Botanical Herbarium, Shandong Normal University). The morphology of the lichen specimens was examined using a stereo microscope (COIC XTL7045B2) and a microscope (OLYMPUS CX21). Lichen substances in all specimens cited were identified using the standardized thin layer chromatography techniques (Culberson 1972). Photos were taken under OLYMPUS SZX12 with DP70.

The new records

1. ***Melanelixia albertana*** (Ahti) O. Blanco, A. Crespo, Divakar, Essl., D. Hawksw. & Lumbsch, Mycol. Res. 108(8): 881 (2004) Fig.1 A
   ≡ *Parmelia albertana* Ahti, Bryologist 72: 236 (1969)
   ≡ *Melanelia albertana* (Ahti) Essl., Mycotaxon 7(1): 47 (1978)

This species is characterized by the mainly corticolous habit, the moderate lobes (2–4 mm broad), the lack of pseudocyphellae, isidia and pycnidia, the marginal and labriform soralia, the granular and whitish soredia, the presence of cortical hairs, the lack of apothecia, the black lower surface, the moderate rhizina, and the presence of lecanoric acid in the medulla (PD–, K–, C+ rose red). The presence of marginal and labriform soralia distinguishes *Melanelixia albertana* from all other *Melanelixia* species. Both *M. albertana* and the related *M. subargentifera* have cortical hairs and soralia. However, *M. subargentifera* soralia are laminal, marginal, and punctiform.

Melanelixia albertana has been reported from North America and Russia (Esslinger 1977, Urbanavichene & Urbanavichus 1998). New to China.

Specimen examined: CHINA. **Sichuan**, Kangding Co., Mt. Paomashan, alt. 2700m, on bark, 2 Nov. 2008, H.Y. Wang, 20084069, 20084070, 20084071, 20084072, 20084073 (SDNU).

2. ***Melanelixia subaurifera*** (Nyl.) O. Blanco, A. Crespo, Divakar, Essl., D. Hawksw. & Lumbsch, Mycol. Res. 108(8): 882 (2004) Fig.1 B
   ≡ *Parmelia subaurifera* Nyl. Flora, Jena 56: 22 (1873)
   ≡ *Melanelia subaurifera* (Nyl.) Essl., Mycotaxon 7(1): 48 (1978)

This species is characterized by the mainly corticolous habit, the broad lobes (2–6 mm), the obscure pseudocyphellae, the presence of soralia or isidia or

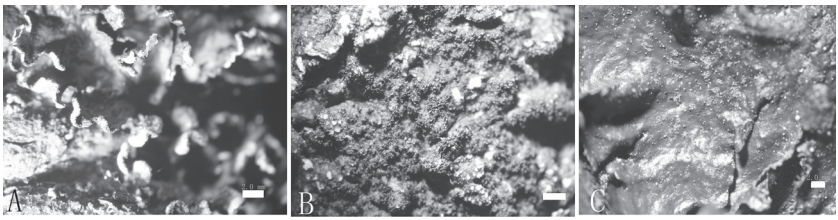

Figure 1 Scale bar = 1 mm. A. *Melanelixia albertana*, showing the marginal and labriform soralia (H.Y. Wang, 20084073); B *Melanelixia subaurifera,* showing the fine and simple isidia developed from the pseudocyphellae (H.Y. Wang, 20084133); C *Melanohalea gomukhensis*, showing the granular to isidioid soredia developed from the pseudocyphellae (H.Y. Wang, 20083584).

both, the lack of cortical hairs, the rare apothecia and pycnidia, the acerose to narrowly claviform conidia, the black lower surface, the moderate rhizina, and the presence of lecanoric acid in the medulla (PD–, K–, C+ rose red). The soralia (if present) with granular to isidioid soredia are laminal, punctiform, and developed from the pseudocyphellae. The isidia (if present) are cylindrical, not or infrequently branched, and usually arise within or between the soralia. *M. subaurifera* is commonly easy to recognize, since it is the only *Melanelixia* species with both isidia and soredia. However, our specimen was not sorediate, only isidiate. Its isidia are fine (0.1–0.25 × 0.02–0.06 mm), simple, and developed from the distinct pseudocyphellae. Within *Melanelixia*, only two species, *M. subaurifera* and *M. fuliginosa* are isidiate and lack cortical hairs. However, *M. fuliginosa* lacks pseudocyphellae, has larger (0.2–1 × 0.05–0.1mm), branched isidia with distinct knob at the end. In addition to lecanoric acid, *M. fuliginosa* also contains another lichen substance (TE-12; Esslinger 1977).

Melanelixia subaurifera has been reported from North America, Europe, Greenland, Iceland, and Iran (Blanco et al. 2004, Esslinger 1977, Gelting 1956, Orange 1990, Sohrabi et al. 2007). New to China.

Specimen examined: CHINA. **Sichuan**, Kangding Co., Mt. Paomashan, alt. 2700m, on bark, 2 Nov. 2008, H.Y. Wang, 20084133 (SDNU).

3. ***Melanohalea gomukhensis*** (Divakar, Upreti & Elix) O. Blanco, A. Crespo, Divakar, Essl., D. Hawksw. & Lumbsch, Mycol. Res. 108(8): 882 (2004) Fig.1 C
≡ *Melanelia gomukhensis* Divakar, Upreti & Elix, Mycotaxon 80: 356 (2001)

This species is characterized by a corticolous habit, broad lobes (4–6 mm broad), distinct pseudocyphellae, black and granular to isidioid soredia developed from pseudocyphellae, black lower surface, moderate rhizina, lack of soralia, isidia, pycnidia, and apothecia, and the presence of fumarprotocetraric and protocetraric acids in the medulla (K+ pale yellow-brown, C–, KC–, PD+ orange-red). The presence of soredia, pseudocyphellae, and fumarprotocetraric and

protocetraric acids distinguishes *M. gomukhensis* from all other *Melanohalea* species. Both *M. gomukhensis* and *M. olivaceoides* are similar in producing soredia and fumarprotocetraric and protocetraric acids (PD+ orange-red), but *M. olivaceoides* has punctiform soralia and lacks pseudocyphellae.

Melanohalea gomukhensis has been reported from India (Divakar et al. 2001). New to China.

Specimen examined: CHINA. **Yunnan**, Shangri-la Co., Tianshengqiao, alt. 3500m, on bark, 2 Nov. 2008, H.Y. Wang, 20083584 (SDNU).

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